M. F. Miller. F. J. Tyler. C. N. Mooney. C. C. Hayden. I. W. Schaeffer.
E. O ›pin. F. W. Taylor. V. H. Davis. C. B. Steward. A. G. McCall, J. T. Dallas.

CLASS OF 1900 IN AGRICULTURE AND HORTICULTURE.

THE AGRICULTURAL STUDENT.

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EDITORIAL CHAT.

In the September Forum there appeared an article by E. L. Johnson, on the New Cereal, Cotton-Seed. Mr. Johnson states how this agricultural product which the farmers were formerly glad to get rid of in any manner has become worth 30 cents per bushel, or $20 per ton.

In comparing the cotton-seed and wheat, the former is shown to have the greatest intrinsic value, and in bulk the cotton-seed of the Southern States amount to five-sevenths of the number of bushels of wheat raised in the United States. Recent investigations show the cotton-seed to have an intrinsic value of fully half that of the cotton crop. The writer then goes on to say that "it seems strange and doubly unkind that the cotton-seed's progress should meet with bitter jealousy or virulent opposition. * * * The finest and best of cotton oil which comprises one-fourth and is the most valuable part of the seed is sweeter in flavor and more neutral in odor than almost any known oil or fat. A considerable percentage of this oil is used in the manufacture of artificial butter, a perfectly pure and wholesome article—a boon to the poor—which enjoys government protection and supervision, and also enjoys a governmental internal revenue tax of two cents a pound. * * * This tax is, of course, paid by the very class of consumers least able to bear it."

"The 'Grout Bill' recently agitated in Congress, reported favorably by a small majority of the Agricultural Committee and likely to be passed at the next meeting of Congress, proposes to increase this tax on artificial butter to 10 cents a pound. Even if this tax does not prohibit the manufacture of artificial butter altogether, which is the real object sought by it, it will hurt not only cotton oil, but also oleo oil, another large ingredient of artificial butter, prepared from the fat of freshly slaughtered Southern and Western cattle. The Southern cattle are raised and fattened on two of the products of the cotton-seed, which comprise two-thirds of its weight, meal and hulls. The passage of this bill will therefore work a peculiar hardship upon the Southern planter; it will lesson the wages of the negro employes of the oil mills; it will reduce the earnings of the negro tenant farmers who often get nothing but the seed out of their crop, and it will check the growth of cattle upon the small farms of the South, than which nothing is of more economic importance to that section today. This bill is in reality a purely sectional piece of legislation, aimed at a cotton-growing section of the United States, in the supposed though

mistaken interest of a dairy section. I say 'mistaken interest,' for if the dairymen would only let oleomargarine alone, it would find its way into all the markets of the world; into places where natural butter cannot go, and in such enormous quantities that to make it would call for more milk and cream (without which it cannot be made) than our present dairies can possibly supply."

The number of students registered in the university at the present exceeds the number registered at any corresponding date in previous years. The registration in the entire university, October 6 was 1292, as compared with 1122 the same date last year. The registration for last year and this, in the Agricultural College is given in detail as follows:

Sept. 23, 1899.	Men.	Women.	Totals.
Old students	45	24	69
New students	36	11	47
Totals	81	35	116

Sept. 29, 1900.	Men.	Women.	Totals.
Old students	55	20	75
New students	40	20	60
Totals	95	40	135

A comparison of the two years show a healthy growth. The Ohio State University is fast coming to the front as a leading educational institution in every line.

Professor Whitney of the Division of Soils of the United States Department of Agriculture visited the University early in the term. He carried with him maps of positions of the great alkali plains of the West, upon which the department has been working in order to ascertain if possible some feasible plan to reclaim these lands for agricultural purposes. After a most careful study of the topography of the country, the nature of the soil and the available water supply for irrigation, Mr. Whitney is confident that large areas of valueless land can be reclaimed and converted in fertile farming lands. This reclamation by a joint system of flooding and drainage—thus washing the excessive alkali out of the land—can be done in a few years at a cost of about $20 per acre, after which the otherwise worthless tracts will be worth from $75 to $100 per acre.

NEWS NOTES.

THE STUDENT wishes to extend congratulations and best wishes to A. G. Abbott of the class of '98, who was married September 27 to Miss Louise Hinsdale, of Wadsworth, Ohio. Mr. Abbott has given up his position in the west and will take charge of his father-in-law's farm.

Through the courtesy of Mr. Frank Talmadge an invitation was extended to Professor Hunt and his classes in agriculture to attend the fifth annual horse show of the Arlington Country Club on Saturday afternoon, October 6th. About twenty-five students availed themselves of the opportunity and spent a very enjoyable afternoon.

J. C. Britton of the class of '98 has bright prospects for an appointment as Assistant Horticulturist at the Texas Experiment Station. Mr. Britton has been a devoted student along horticultural lines both before and since graduation, and in the recent Columbus Civil Service Examination for park superintendent he received the highest grade. A man with a lower grade received the appointment, however, by virtue of larger practical experience.

The Asparagus Club held its first meeting of the year last Tuesday evening, October 9th, in Horticultural Hall.

The club was favored with a paper by Professor Lazenby, after which the remainder of the evening was spent in an informal discussion of horticultural topics.

Mr. Pierce, who was a student in agriculture at O. S. U. for the years of '98 and '99, again greeted old friends on the campus during registration week. Since leaving O. S. U. he has been employed as a dairyman in the East, and spent one term in the College of Agriculture at the University of New Hampshire.

A New Magazine.

The O. S. U. Naturalist is the title of a periodical to be published under the auspices of the Biological Club. There has been a long felt want for such a periodical in the University—the center of biological research in the State—and the Naturalist will be welcomed by everyone interested in the sciences pertaining to Natural History.

The O. S. U. Naturalist will be issued monthly during the academic year, beginning November 1 and ending June 1. It is to be octavo size, of a varying number of pages, and will contain papers on the Natural History of Ohio, papers read before the Biological Club and notes and observations from interested parties throughout the State.

That the Naturalist will be a success and a credit to the University is guaranteed by the announcement of the Staff and Advisory Board, taken from The Lantern:

The editorial staff for 1900-1 is as follows: Editor-in-Chief, John H. Schaffner, A. M., M. S. Associate editors, Zoology, F. L. Landacre, B. Sc.; Botany, F. J. Tyler, B. Sc.; Geology, J. A. Bownocker, D Sc.; Archæology, W. C. Mills, B. Sc.; Ornithology, R. F. Griggs. Advisory Board, Prof. W. A. Kellerman, Ph. D., Department of Botany; Prof. Herbert Osborn, M. Sc., Department of Zoology; Prof. J. A. Bownocker, D. Sc., Department of Geology.

The price of the Naturalist for the year 1900-1 will be 50 cents, payable in advance. Your co-operation and subscription are earnestly solicited. Please address correspondence and subscriptions to The O. S. U. Naturalist, Ohio State University, Columbus, Ohio.

THE STUDENT extends to the new periodical every wish for a successful and long career. Godspeed the O. S. U. Naturalist.

Death of Sir John B. Lawes.

The death of Sir J. B. Lawes occurred at Rothamstead, England, at eight o'clock on Friday, August 31.

Sir John Bennet Lawes was born December, 1814, and succeeded to his estate at Rothamstead, in 1822. Mr. Lawes was educated at Eton and at Brasenase College, Oxford. During his academic career he displayed a strong partiality for the laboratory and on leaving the university spent some time in London studying the science of chemistry. Possessed of independent means he at once interested himself in agriculture. In October, 1834, he first commenced regular experiments in agricultural chemistry, and from that date until his death he has been unceasingly applying his knowledge to the solution of questions pertaining to practical agriculture.

In 1843 he enjoyed the assistance of Sir John H. Gilbert, the present director at Rothamstead, and undertook with him a series of agricultural investigations in the field, feeding shed, and laboratory, the results of which are known by agricultural students throughout the world.

Not only were the services of Sir John Lawes appreciated and rewarded by England, but they were recognized and honored the world over.

The Rothamstead Experiment Station has been from the first wholly unconnected with any external organization, and has been maintained exclusively at the expense of Sir John Lawes himself. Independent of the large sums which he spent on it during his lifetime, he set apart £100,000 and certain areas of land for the purpose of keeping up the system after his death. Perhaps no other man in the world has done more to place agriculture on a practical scientific basis, and the name of Lawes will forever be a household word among scientific agriculturalists.

Arlington Club Meet.

Through the courtesy of Mr. Frank Tallmadge of the Arlington Country Club, an invitation was extended to Professor Hunt and his classes in Agriculture to attend their fifth annual horse show, which was held at Arlington on last Saturday afternoon, October 6th.

The showers of the morning, followed by the pleasant weather of the afternoon, made it an ideal day, and about twenty-five O. S. U. students swelled the crowd of anxious spectators who watched the noble horses compete for the various prizes.

The management was perfect. The judge, Mr. G. F. Stephens, of Cleveland, won the esteem of all present by his impartiality and good judgment. Even the horses seemed to appreciate the occasion, or to use a quaint old saying, they seemed to "feel their oats," and certainly horses could not have shown off to better advantage.

Horses which deserve especial mention were Neil's roadsters, Bonnie and Billie, Mr. Babcock's Bessie, Mr. Tallmadge's gentle saddle horse Fulton Denmark, Mr. Neil's saddle mare Missie, and Nicholas who won the hearts of all by his exhibition of a high jump.

The students of the College of Agriculture highly appreciate the benefit which they may derive from such exhibitions of fine stock, and desire to extend their thanks to Mr. Tallmadge for his kind and thoughtful invitation.

A. H. S.

New Book in Agriculture.

Among the requirements of the four-year course in Agriculture there is a course of lectures on the History of Agriculture and a shorter course on Rural Economics, delivered by Prof. Hunt to Junior and Senior students. Realizing the value of these lectures as a sort of summary of the work previously done in the course, and as a connecting chain of the reading required, the students of the classes of '99 and '00 asked and received permission to have a limited edition printed. After some delays in printing the book appeared during the summer vacation. The book contains over 120 pages closely but clearly printed, and is neatly bound in cloth. It is divided into two parts, part one being devoted to a History of Agriculture, and consists of two chapters on Egyptian agriculture, one on Grecian agriculture, two on Roman agriculture, three on British agriculture, and six on American agriculture. Part two deals with Rural economics, one chapter treating of the farmer's capital, another with grain farming, and a third with animal husbandry. The book concludes with a series of five appendices. Appendix A gives the sources of information; B, a select list of Rural books; C, a problem in farm management; D, treats of the Extent of Agriculture in the United States, and E, of the Cereal Production in the United States. Of the book The Lantern says:

"The work is a decidedly interesting one, and is written in Professor Hunt's usual clear and decisive style. The Agricultural Department is certainly to be

congratulated upon having at its head a man who has already won renown as a writer upon agricultural science, and who is steadily gaining new prestige among students of agriculture."

"Professor Hunt very kindly presented the O. S. U. Library with a copy of his new book."

City Civil Service.

A competitive examination was held Monday, September 23, for the position of Superintendent of City Parks. The examination was conducted by Prof. Lazenby, nine applicants presenting themselves. This position is a very desirable one and has heretofore been filled through political influence in which merit was, to a certain extent, lost sight of. The movement to make the appointment wholly upon merit is a step in the right direction. The appointment will be made by October 1st. The following list of questions will give some idea of the extent of the qualifications required for the position:

EXAMINATION OF CANDIDATES FOR PARK SUPERINTENDENT.

1. What should be regarded as the principal objects or main uses of a city park?

2. What general rules should be observed in the laying out and construction of park walks and drives?

3. Discuss the general management of the park lawn.

4. Name the best varieties of grass for a park lawn and state how a lawn should be seeded.

5. How should trees be distributed and, as a rule, where should they be planted in parks?

6. What are the essentials or requisites of an ideal park tree?

7. Name a list of ten of the best large trees for Columbus parks?

8. Name five trees of medium size for planting where space is limited.

9. Explain in detail when and how park trees should be planted.

10. How should shrubbery be grouped for the best effect in parks?

11. Name six of the most desirable shrubs as far as form and foliage are concerned.

12. Name six that are especially desirable for their bloom.

13. What perennial herbaceous plants are among the best for park planting?

14. Name a list of the most effective bedding plants.

15. Name six hardy roses that are best suited for parks.

16. Treat of lakes or ponds in parks, including their use and the best method of planting around the borders.

17. What kinds of fish and water fowls are best adapted to park lakes or ponds?

18. How would you treat the necessary outbuildings in a park with a view to making them as inconspicuous and secluded as possible?

19. Is it advisable to have special areas in parks for children's playgrounds; if so, how should such grounds be laid out and furnished?

20. Name the objects or uses of a park green house or conservatory, and about what area of glass should there be for every ten acres of park?

Mr. C. B. Steward of the class of '00 will return to the University for post-graduate work in Agriculture, about the middle of October. Mr. Steward is at present preparing a herd of fine Shorthorn cattle for the Fairfield County Fair. If any other showman wins the prize over Cy's herd they will have to hustle.

Messrs. C. N. Mooney and A. G. McCall of the class of '00 have returned for post-graduate work in agriculture. M. F. Miller and V. H. Davis of the same class will spend the coming year in Cornell.

American Progress in Dairying.

HENRY E. ALVORD,
Chief of the Dairy Division, Department of Agriculture, Washington, D. C.

Our dairy cattle are the select cattle of the dairy industry. All agree in cattle being adapted to the dairy. Cattle used especially for dairying have made but good showing. We have tested the adaptability of cattle to dairying and we have certainly made progress in our work. As has been repeatedly stated today, after the cow has played her part a great deal depends upon the dairyman. As for the cheese it must be better taken care of. People better understand the reasons for taking good care of the milk. And our milk shows a remarkable care taken of the milk on the farms. I am afraid it is true that just as much poor butter is made on the farm today as was ever made. If it were not so there would not be so much very poor butter. The proportion of bad butter is very large. But it has been a very great step in advance to organize creameries for dairying. This is a needful progress, for it is doing away with so much impure butter; and the butter from the creameries far outranks farm butter. What the farmers want to do to get pure butter is to unite their methods as they have been explained here today. The main advantage the creamery system is that it gives a uniform product of butter. Where ten, twenty, or fifty farms have united better means for making uniform butter are procurable. Just as the union has been a success the best advantage to be gotten is uniting these factories themselves. The most hopeful thing I see is the organization of farmers and buttermakers. There is a question in transporting the cream. But this can be done at long distance without depriving the quality of the butter.

If we turn to the mechanical side of the dairying in which this country excels all others we will find two evidences of progress. The centrifugal separation and the Babcock test are recent inventions. These are things of the greatest moment in our dairy. I have no hesitation in saying that the milk supplies of our cities and towns have made marked progress. Farm made cheese is practically disbarred. Factory cheese is the cheese of today. I believe I could have come into this state perhaps thirty-five years ago and get as much farm cheese of high standard as I could get to-day. The grade of butter has also made a marked progress. This is due to the creamery system. Creamery butter is on the average better than dairy butter. More butter is made on farms than in creameries. I don't believe that the average product of the creameries is any better than, or as good as, it was twenty years ago. The cheese of Ohio is not as good as it was twenty years ago. If I am right, are there any reasons for these results? I believe there has been a tendency to carelessness. I believe there has been a decrease of care and work in our creameries? They have been trying to economize in work and expenses. In cheese making the managers seem to be trying to report the increase in the number of pounds of cheese to the one hundred pounds of milk. Theirs is a quick deteriorating and rotating system. I think that there is a tendency to consume more of the soft cheese than any other. Why our factories don't try to make more of this kind of cheese, I don't understand. I believe the same is applicable to creameries. They haste through with the cream too much. There is a crave for the quick high flavor that is in the soft cheese. At the end of sixty days it is better than at the end of ten days.

We have been trying to find new markets for our products. If we don't we will find a surplus amount of butter on our hands greater than at the present. Home cheese is not good for export trade at all. We must have a different article. The same thing is true of creamery butter. I buy twenty packages of creamery butter and twenty packages of specially made butter with the view of testing the staying qualities of the butter. I sent these packages to foreign places and found that the creamery butter did not reach there in good shape while the butter specially prepared held up well. I am afraid that the creameries did not live up to the proper methods of making the butter and cheese. After making befitting apologies for passing a joke on the deceased, Major Alvord related a little story about Prof. Townshend when he was at the head of the Agricultural Department. The faculty had granted him a leave of absence. "Now that you are going abroad?" the trustees asked Mr. Townshend, "wouldn't you like to have some money to advance your department?" "Yes," said Prof. Townshend. They thereupon gave him fifty dollars with the instruction to use it the best way he saw possible. Prof. Townshend was gone for some time and came back to his work without having invested his money. Upon being asked why he did not spend it he said, "Well, I knew the University didn't have much money so I thought I could do more good by bringing the money back to her."—Report of Ohio Dairymen's Association.

Center of Population.

The census of 1900 will probably show, figuring on the old basis, that the center of population has moved across Indiana and is somewhere between Terre Haute and Vincennes.

Protection of Small Fruits From Frost.

We wish especially to call the frost warnings, to the particular attention of the farmers, fruit growers and market gardeners of Ohio, and to impress upon you the fact that these warnings are accurately forecast by the Bureau, that we will arrange to place them in any section of the State where they will be used, at Government expense, and that most crops can be effectively and economically protected from frost.

The surface of the earth and the objects upon it are warmed up rapidly during the daytime, in bright sunshiny weather, but at night the heat is radiated just as rapidly into space, until the earth is cooler than the surrounding air. The air then in contact with the earth cools by conduction, and, as the air is a poor conductor the cool strata of air is very thin and lies close to the earth if the air be calm and still. The cooled air in lowlands and valleys lies still and gets colder and colder. But on the hillsides, being heavier as it cools it slides down slowly into the valleys, increasing the area of cold air there, and lifting up the overlying warmer body of air which in turn flows in horizontally to take the place of the colder air on the hillsides which has descended. This movement of the air accounts for the great difference in damage by frost on different fields. The successful grower of fruits and vegetables that are liable to damage by frosts must have this movement of the air in mind on clear, still, frosty nights. Frosts are not apt to occur when the air has considerable motion, as it is continually mixed and the warm air is being continually brought in contact with the cooling ground. Neither do we fear a frost when it is cloudy, as the clouds form a curtain to prevent or check the free radiation of heat from the ground.

Local bodies of water, by keeping the air more nearly saturated with water and thus tending to raise the dew point above the point of frost formation, should be taken into account in locating tender or early plants or fruits. Moisture in the air, whether invisible or not, tends also to prevent the loss of heat from the ground by radiation; on the contrary, a limited amount of moisture in the soil tends to increase the danger from frost by increasing the evaporation and the consequent loss of heat at the surface of the earth and plants.

It is evident, then, that fruit and vegetable growers in the hilly or rolling sections like most of Ohio should so place their earlier and more tender crops as to avoid the lowlands and valleys and very wet lands, and plant on the hillsides or ridges. Or whenever it is possible to take advantage of bodies of water and plant on the leeward side. An intelligent and experimental study of these conditions and locations must be made, however, by each one for himself.

The artificial appliances for protecting crops against frost are based upon the following effects and conditions or a combination of them, for one result is never obtained without the others also, to a partial extent at least: To actually cover or roof in the plants; to prevent a rapid radiation of heat from the earth; to increase the moisture in the air; to directly warm the air; to create artificial drafts, whereby the air is mixed and the cold air is not allowed to lie at the surface of the earth.

Covering with screens of any sort must necessarily be limited to small lots because of the expense; but strawberries and other low plants may be effectively protected with straw or hay, and frequently young potatoes may be saved by covering them with earth by means of the cultivator or plow. Radiation of heat may be checked by building smudge fires on the windward side of the orchard or field, particularly on limited bottom lands where the smudge would not move far. But when, to secure the smudge, a material is used that will also add moisture to the air, the cheapest and most effective plan is probably in operation. The smudge of vapor and smoke may be secured by building frequent fires of damp straw or stable manure about the orchard or field. A good method is to pack damp stable manure into common grain or burlap sacks. They should be distributed through an orchard in rows about 100 feet apart and about 50 feet between sacks in each row. When it is necessary to use them, a small amount of coal oil should be poured on each sack and ignited. It is usually unnecessary to fire more than every second or fourth sack. These sacks will burn with a smoldering fire for several hours. The amount of heat set free by burning one sack of manure weighing fifty pounds and condensing the water vapor near the earth would be sufficient to raise the temperature twenty degrees in a space seventy-five feet square and twenty-five feet deep. If one-fourth of this heat remained within this area it would give ample protection during an ordinary frost. Bales of wet straw have been successfully used. One hundred pound bales were cut into four pieces and properly dampened.

The best plan of all, however, is to use portable smudge fires. A wire netting can be stretched from four stakes on a low truck wagon or old sled and covered with a considerable thickness or wet manure. Dirt is then thrown on the wagon body to protect it, and pots of burning tar or oil are set under the straw. A barrel of water is carried on the wagon to keep the straw wet.

In this way the fire can be moved wherever it is most needed, which is generally along the windward side of the orchard, but which may be in the lowest place; the loss of heat by an upward draft is prevented, and instead it has been found that the smoke and vapor from this fire spread out in a long trail behind the wagon, settling down rather than rising to any considerable height, and effectively shrouding the orchard or covering the field with a thick fog. One team can protect a great many acres in this way. The plan is well worth adoption in this state, and we trust that whoever does attempt it will write our office in Columbus of the results.

A mixing of the air can be effected by building numerous fires; these will also raise the temperature of the air to an appreciable degree. The Riverside Horticultural Club, in California, in 1897-8, carried on very careful experiments, and among them was the use of wire baskets of coal scattered about the orchard for the purpose of giving dry heat to the air. Their best results were obtained with from twenty-five to fifty baskets to the acre. In one case one man, working alone, with twenty-five baskets to the acre, raised the temperature of his fruit orchard from three to five degrees and saved his crop of oranges worth $400. The cost of equipping an orchard with fifty baskets to the acre was about $5, and the fuel to run them for one night was less than $3. Where coal is as cheap as in Ohio there should be a thorough test of this plan.

Cabbages have been effectively protected in Texas during temperature considerably below freezing by a handful of hay placed on the north side of the plans, and potatoes were saved by covering with old sweet potato vines. Strawberries not mulched or protected by hay last winter were generally killed there, while protected strawberries were largely saved. About ten tons per acre of hay, costing about $1 per ton, was used. In the extreme South very much is being done in protecting against frosts and freezes, and in experimenting in smudges, irrigating and spraying, etc., to protect the crops, and it is important that the gardeners and fruit growers of Ohio awake to the possibility of action along this line. Forecasts and warnings can be secured by corresponding with the Weather Bureau Office at Columbus, and all possible suggestions and assistance will be given to aid it protecting the crops.—J. Warren Smith in Journal Columbus Horticultural Society.

The O. S. U. Lake Laboratory.

The Lake laboratory of the Ohio State University was established under the direction of the late Professor Kellicott, for the purpose of providing opportunities for the investigation of the biology of the Great Lakes.

The laboratory is located at Sandusky, a few rods from the waters of Sandusky bay. It is housed in the former State Fish Hatchery building, which is a commodious two-story frame structure, abundantly supplied with windows to insure ample light. The first floor contains a large laboratory arranged with stationary tables and supplied with microscopes, aquaria and other apparatus from the university. This laboratory, during the past summer, accommodated the classes in general zoology and embryology. To the rear of this laboratory and connecting with the same is a store room, to the right of which is a dark room for the accommodation of those students and investigators supplied with cameras. The second floor contains a store room and a large well-equipped laboratory for the accommodation of the classes in

entomology, ischthyology and botany. Besides the equipments above mentioned, the laboratory is supplied with row and sail boats which are constantly at the disposal of the students. Dredges, seines and collecting apparatus of various kinds are supplied to accommodate all the students.

In addition to the original purpose of the laboratory, it has recently been determined to provide courses of instruction and to combine work of the departments of botany and zoology. During the past summer the following courses were offered:

ZOOLOGY AND ENTOMOLOGY.

(a). Laboratory and field course including dissection or microscopic study of type forms, aquaria and field studies, with instruction in collecting and preparing material for laboratory use and permanent collections. Special attention given to fishes and food of fishes.

(b). Advanced course in Invertebrate Morphology or Embryology.

(c). Field and laboratory course in Entomology.

(d). Special course in Ichthyology, devoted particularly to the lake fishes, their habits and food supplies.

BOTANY.

(a). Laboratory and field course, including a study of type forms. The course included collecting trips in the field where common species of each class are found, classification of familiar forms, study of structure and special parts of interest in connection with each group, with methods of preserving for immediate use and permanent preservation.

(b). General botany consisting chiefly of Ectology and Morphology.

(c). Laboratory course; the work to be arranged. The regular courses at the last session began July 2 and continued eight weeks. During this time the regular professors of the university were present and took a deep interest in every detail concerning the welfare of the student as well as the laboratory.

Of the opportunities for investigation and the material available for that purpose, it is hardly necessary to speak.

The waters of Sandusky bay teem with animal and plant life. In and around the bay are extensive marshes. In the eastern part of Sandusky bay is the Black Channel, which is of special interest to the biologist. The country about Sandusky contains abundant native woodland. About three miles north of the city is Lake Erie.

Separating East Sandusky bay from the lake proper, is a point of land about eight miles long and one-fourth mile wide. This is Cedar Point, well known on account of the famous summer resort near its western extremity. This point is covered with various kinds of trees, shrubs and flowers. The trees and shrubs are generally penetrated by various kinds of vines and other plants, thus making at some places a vegetative network so dense as to be almost impenetrable. These wildwoods contain no poisonous reptiles, thus allowing the naturalist to explore the thickets unconcerned.

The open places on the Point afford rare opportunities for the student of Entomology. In odonate fauna that vicinity is very rich. Along the northern boundary of this Point is a most delightful beach. Besides the beautiful scenery this beach presents, it supplies a great amount of material for scientific study. The writer making several trips along this beach every day for several weeks did not acquire a feeling of monotony, for at every trip new material of the most interesting nature had been cast ashore by the surf. The trees and shrubs shelter many kinds of birds, while the surrounding marshes afford

excellent opportunities for studying water fowls.

Besides these points of interest in the immediate neighborhood of the laboratory, the student has abundant opportunities to visit the neighboring islands and peninsulas, e. g., the U. S. Fish Hatchery at Put-in-Bay, Kelley's Island, with its famous glacial grooves, Catawba with its extensive vineyards for the student of entomology, and others. Besides, there are weekly excursions to Cleveland, Buffalo and Detroit.

The student body of the laboratory, during the past summer, was composed of college professors, high school principals, graduate and under-graduate students—evidently a choice society for any one to work in.

The prospects for the next session are very promising. All those who were present the past summer are determined to attend next summer. Not only does the easy access to material make this institution so attractive, but the cool lake breezes during the hot days of July and August make the students' work highly recreative as well as instructive.

A. F. C.

Care of Corn Stover.

This is a year when rough feed is scarce and it is to every farmer's interest to save the corn stover to the best of his ability. The dry weather during the months of May and June cut the hay crop short. The failure in wheat leaves us without any straw for bedding and straw is used to some extent for roughage. When the rains come it was so late that most of us could not get ground ready for millet and besides it was not safe to risk very much seed at that time in the season.

Then comes the dry fall, which cuts off our usual late pasture, and we have to feed about as much as we do in winter.

We are going into winter with a great shortage in rough feed here in central Ohio. Corn stover is the only thing we have to supply this want, and it will be our place to make it go as far as possible. In many places the corn stover is not up to the standard, owing to the corn being blow down. I will give what I think the best way to handle the stalks to get the most good. We cut our corn in shocks, 12 hills square. As soon as the corn is dry enough to husk, husk and bundle the stover in small bundles bound in the middle. Each shock will make from six to eight bundles, if it is good corn. Set two or three shocks together in the field and draw the tops well together with rope and ring (or anything made for the purpose, some prefer the patented tires), then tie with twine. Stover will keep in such shocks all winter. When it comes a good damp day haul in what the barn will hold and store it away. Then whenever it comes good weather during the winter, replenish the supply in the barn. In many instances this winter there will be room enough for nearly all of the stover, as there is not the usual supply of other feeds.

Some prefer to husk with the shreader. It has been our experience that it is very seldom we can get the stover dry enough to keep when packed in a bay before the first of November, and I think much of the corn should be in the crib before that time unless it is an exceptionally moist fall.

I think cutting or shredding the stover adds much to the feeding value, and it leaves it in such nice condition for bedding. It is a pleasure to feed and handle shredded stover after handling whole stalks.

We haul in quite a lot here at the University as I have described, when it

has been in the barn a couple of weeks cut it out with a shredder we have and haul in some more, while the cut stover is being fed the whole is drying so we are feeding shredded stover all the time and have some drying at the same time.

Unless a farmer has his corn husked with a shredder I would advise buying a fodder cutter or shredder before buying a grinder. I do think there is nothing so disagreeable to feed in a barn as whole corn stalks.

When we feed shredded corn every evening, before feeding go through and clean all mangers and throw the butts under the horses and you have them bedded with the very best kind of substitute for straw.

I would prefer the shredder to the cutter for cutting dry fodder. It leaves the feed in better condition for the animals. Where one has a cutter for silage it is not profitable to own both, in that case use the cutter.

FRANK RUHLEN.

The Science of Manufacturing Fine Country Butter.

Making fine creamery butter is not confined to the butter-maker alone, there are others whose work plays an important part. It has been said that to make fancy butter you must begin at the weigh can. I believe we should go back still farther and begin at the milking of the cow. It has been clearly demonstrated by studies and investigations concerning the production of dairy products that the manufacture of fine butter is really a science and cannot be classed as a single trade. It is an industry requiring intelligent workers, not only familiar with the manipulation of each branch of the work, but well grounded in its underlying principles and these principles should be strictly adhered to even in the smallest detail.

The fact that the raw material with which we have to deal is so delicate and so easily changed calls into play our best efforts to prevent harmful bacterial infection, that the milk is continually subject to, during the various manipulations through which it must pass, until it is converted into the finished product.

The constantly increasing demand made on butter-makers of late years for a higher quality of product requires more thorough understanding and a better knowledge of the principles of butter-making on his part, and of milk production on the part of his patrons. The average creamery patron has not been able to avail himself of the opportunities to learn these principles as the butter-maker has, therefore, the butter-maker has to act as their instructor in order that they may know the important part they play in this great industry. They must be taught the absolute necessity of delivering good milk, and to do this he must know the value of strict cleanliness in every detail, both in milking and in caring for his milk. The value of aeration, quick cooling in an atmosphere that is pure and wholesome, removed from the cow-stable odors and others that are equally as bad, then to carefully keep the milk free from infection until delivered to the factory and teach him to feed the proper feeds that exert an influence on the flavor of the butter. Also he must be taught to discard all old rusty cans and to allow no dirt to collect on the inside or outside of those that are not rusty or in any of the utensils with which the milk comes in contact. We all know it is impossible to produce milk that is entirely free from germs, but it should be as near that point as possible.

He should not be allowed to form the bad habit of bringing his milk every other day during the winter months. This decreases the value of the milk to

a great extent and renders the production of a fancy finished product doubly difficult. When this milk is received in very cold weather it may not be possible to detect any odor, but when it is warmed up and passing through the separator there are oftentimes taint plainly discernible,—not a distinct acid smell but one that is much worse, showing the presence of putrefactive bacteria that cannot be gotten rid of entirely in the cream vat, except by pasteurization. When we all receive milk every day from well cared for and well fed cows that are attended to by men who are thoroughly interested in their work; when the creamery patron learns that his work is identical with that of the butter-maker and creamery owner, he tries to deliver his milk in the best possible condition instead of a condition just short of being too bad to be received. We will be much more certain of making a fine grade of butter at all times and the butter-maker will not be justified in blaming the patron for any mistakes that may occur.

In receiving milk at the creamery, the butter-maker must exercise his care and judgment. If he finds that a patron has not heeded his instructions and that his milk is bad, he must reject the milk kindly but firmly until the milk comes in good shape; he must not allow his sympathies to cause him to err in his judgment or it will cause his reputation to suffer; he must use every effort to keep out all milk that will introduce germs that are harmful to the finished product, and he should also not forget to exercise cleanliness with himself and his surroundings. It is useless trying to educate your patrons to bring good clean milk to a creamery where there is no effort to keep things clean and neat. You must practice what you preach in this line or your preaching will not do much good. This principle of strict cleanliness must be very much in evidence in every line of your work if you wish to make a success, and all creameries should be constructed so as to make it as convenient as possible to keep them clean.

After the milk is received, be careful in tempering to keep as even temperature as possible. Have a tempering vat of large enough size so as not to have to force the milk too rapidly. The milk should not be heated by forcing live steam into it directly because the steam is apt to contain impurities, especially so if boiler compound is used which will leave a taint in the cream, and even if there was no other objection, the separation is not as good as when the milk is heated more slowly. If a pump is used to elevate the milk it should be so constructed that it can be easily taken apart and cleaned. A dirty milk pump and the pipes that lead to and from it, are capable of causing an endless amount of trouble. If they cannot be thoroughly cleaned in a satisfactory manner, the separator comes in for its share of attention and should be watched closely. After the cream is separated it should be cooled as soon as possible. The high temperature necessary for a complete separation renders this necessary to secure a good body to the butter. Where the air of the creamery is as pure as it should be there is a great deal of benefit to be derived from running the cream over some form of a cooler before running it into the vat. This gives the cream the benefit of aeration and at the same time cools it very rapidly. If the air of the creamery is not pure, this part had better be left out. If it is not convenient to cool the cream so low, it may be cooled to ripening temperature and ripened as soon as possible, then cooled down to churning temperature and held for some time. This is necessary as the fat globules do

not cool as quickly as the milk serum and must have more time.

In the ripening of his cream the butter-maker is called on to use utmost care and his best judgment. This is the critical part of the work and one that too often receives less attention than it should. The cream will, of course, go through some sort of a souring process if left to itself, but the butter-maker that allows this can never expect to make fancy butter. If he does, it will be the exception, not the rule.

This work should be done at certain temperatures to produce the desired results and secure the right amount of acid in cream at the right time. He must remember that the development of the right amount of acid is necessary to produce a good flavor and be sure he has that amount. He must see to it to the best of his ability that no germs find their way into the cream except those that are necessary to help him in his work. There is no need for guess work as to when the right amount of acid is developed; the acid tests now in use serve to show at once when we have the right amount.

In the process of cream ripening a good starter is a great help, both in hastening the ripening process and in developing a good clean flavor. With a good starter, there is much more certainty of securing a good uniform high quality than when the cream is allowed to ripen without. The quantity to be used must be regulated by the butter-maker according t the condition of his cream, but a starter may prove a dangerous thing if not handled carefully. The butter-maker should not fall into the habit of using a starter carelessly with no regard for its quality, and the development of the starter should be watched carefully, not guessed at, and when it has developed sufficient acid it should be cooled immediately. A good skim milk starter is most generally preferred where good milk is easily obtained. The use of buttermilk for a starter is not to be encouraged as it cannot add to the value of the product except by hastening the ripening process, the same germs being introduced from day to day. They are too often left to take care of themselves until they are ready for use. I believe there is much good butter ruined by the use of starters that have become too sour.

The pure culture starters are of great benefit, but to get their full effect it is better to use pasteurized cream, and if their directions for preparation are followed closely the same amount of care in the preparation of a good home-made starter will give equally good results in most cases.

After the cream is ripened it must be cooled for churning. If ice is used directly in the churn the temperature must be lowered several degrees below the churning temperature as the fat globules do not cool as quickly as the milk serum and we are apt to be churning at a higher temperature than the thermometer would indicate. If possible, it is better to cool the cream in the vat and hold it for some time to allow the fat globules to cool.

The churning should be done at the lowest temperature possible and yet if the butter comes in a reasonable length of time, no set rule can be laid down as the temperature must be varied to suit the existing conditions. The low temperature gives more exhaustive churning and leaves the butter in better condition to be handled. It can also be freed from the buttermilk with less washing which is an important point. Do not churn the butter too much. Butter can be spoiled as much by over-churning as by over-working. When the butter is churned until it is no longer in granules but in chunks, it is almost

impossible to free it from the buttermilk and make it look like a fancy article.

In washing butter I do not think it advisable to use water that is too cold. It should not vary more than two degrees from the temperature at which the butter comes unless it is in very warm weather and there is no room cool enough to work the butter in a satisfactory manner, when it may be used colder.

In working the butter it must not be over-worked so as to give it a greasy appearance and yet it must be worked enough to incorporate the salt thoroughly and prevent mottles. Whether to work it once or twice is a question that each butter-maker must settle for himself, governed by the conditions under which he works. If the butter is too warm the water can never be expelled from it by working; and if too hard the salt will not dissolve properly. There, as in all other points, the temperature plays an important part. In using the combined churn and butter-worker, the working should not be done too quickly but should be stopped often and allowed to drain; otherwise the butter will contain too much moisture. Just which method is the best, the combined churn or the box churn and open workers, is a disputed question. Good work has been done in both and there is more in the butter-maker being able to handle his churn and worker well, whichever kind it may be than in the kind he uses so it is of good make.

In packing, use a package that suits the trade to which you ship your butter and do not be afraid to use a little extra care to have your packages look neat. Never use poor tubs because they are cheap and always use good parchment liners. The appearance of the packages goes a great ways towards helping sell the butter.

I have endeavored to give a few points on regular routine creamery work, but to the butter-maker who is thoroughly interested in his work there is something more in this than mere labor. He must be alive to his business, not doing his work drudgingly and following it automatically without any regard to the ever changing conditions. He must be always striving to learn more of the new things that are being opened up to us every day and which are required if we wish to keep up with the advancements being made in the science of butter-making.

It can be readily seen that the subject that has been assigned to me is of too large a scope to be done full justice in the time usually occupied by a paper. I have given, therefore, only a few points on the manufacture of fancy creamery butter that my practical experience has taught me to be necessary, without going too much into detail.—Oscar Reed, in Proceedings of Ohio Dairymen's Association.

Trotting Horses in the United States.

It is only within comparatively recent years that this country could boast of a breed of trotting horses that was distinctly American, and it might be of interest to inquire into the origin and development of this distinct type in the United States.

Of all the horses that have helped to found this breed none have played a more important part than Imported Messenger, a thoroughbred brought from England in 1788. He was foaled in 1780 and bred in Newmarket, England, by John Pratt. In his veins flowed some of the best blood of the east, as is shown by the following statement of his ancestry. Messenger was got by Mambrino out of a daughter of Turf. Mambrino is traced back through En-

gineer, Samson, Blaze, and Flying Childers to Darnley Arabian, a horse imported from the East during the reign of Queen Anne. Turf, the sire of the dam of Imported Messenger, traces back through Matchem and Cade to Godolphin Arabian, one of the last horses to be imported from the East; and his second dam was by Regulus, who was also a son of Godolphin Arabian. Messenger left behind him no record of his own speed, but he left a progeny greatly noted for speed and endurance. These were selected and mated with a view to increase the speed and endurance, and the result has been an augmentation of these two desirable characteristics in each succeeding generation. His three most noted sons were Winthrop's Messenger, Bishop's Messenger and Mambrino. The first two named produced many good trotters, but it is in the last named that the chief interest is centered, for Mambrino produced two lines, the greatest in the history of the trotting breed. One son of Mambrino, Mambrino Paymaster, gave us Mambrino Chief, the founder of the Mambrino family of trotters, and another son got Rysdyks Hambletonian, the founder of the greatest trotting family that the world has ever seen. Imported Messenger died on Long Island in 1808.

Imported Bellfounder was another original source of trotting blood. He was a so-called Norfolk Trotter, foaled in 1815 and brought to the United States in 1822. He lived to be twenty-eight years old. If his pedigree is perfectly reliable he was a descendent of the Fireaways, the best saddle strain that England has ever had. He can be traced with considerable accuracy through Old Bellfounder, Haphazard, and Sir Peter back to Eclipse; his grand dam was of good lineage but was not a thoroughbred. Bellfounder had powerful quarters, showy trotting action and a good disposition, all of which qualities were transmitted with remarkable honesty to his offspring. He was the sire of the dam of Rysdyk's Hambletonian, and it is here in combination with Messenger blood that the Bellfounder strain reaches its highest perfection.

Duroc, although not an imported horse, was another early source of trotting blood. He was foaled in 1806 and bred in Virginia. His sire was imported Diomed, a chestnut colored horse and the winner of the first English derby. On his dam's side he is traced back to Medley by Gimcrack.

From his sire's side Duroc inherited a high quality of nerve and spirit, and from his dam's side he received a particular conformation, wide hips, long, powerful thighs and hocks placed low down over short cannons. This conformation which he faithfully transmitted to his descendants, gave rise to a straddling action which is regarded by many as a sure indication of trotting qualities.

The Duroc blood, like that of Bellfounder, reached its highest value when found in combination with the Messenger breed.

Still another source of trotting blood is through Pilot whose ancestors were imported into Canada from France and which formed a valuable class of horses since known as French Canadians.

Pilot was a black spacer foaled in 1826, but first came to notice in 1832 in New Orleans, when he was bought of a peddler for $1000. He was less than 15 hands high, with short thick neck, a long coarse mane, a close-knit, muscular body, a sloping croup, and locks placed low down.

Pilot's most noted descendants have been through his son Pilot, Jr., who was a horse of much individual merit as well as the sire of many trotters. Pilot, Jr.,

was noted for his ability to get trotters from running mares, and although he produced some noted sons, his daughters as brood mares have been the most highly prized. One of his daughters produced the great trotter Maud S., and the famous double-gaited gelding Jay-Eye-See, both of which were descended on the other side in a direct line from Rysdyk's Hambletonian.

Grand Bashaw was a Barb, imported from Tripoli in 1820. He was a black of beautiful conformation, but it is only through his son, Young Bashaw, got by First Consul, a grandson of Imported Messenger, that Grand Bashaw has become noted as an original source of trotting blood.

Some deny Grand Bashaw this claim and assert that the Bashaws and their noted descendants—the Clays—are only a branch from the great Messenger family. It must be admitted, however, that Grand Bashaw was capable of introducing the one needed element that went to make up that particular strain of trotters.

Justin Morgan was a bright bay stallion foaled in 1793, near Springfield, Mass., and died in Vermont in 1821. His lineage is a matter of doubt, but it is believed from circumstantial evidence that his sire was a thoroughbred and that his dam had Arabian blood in her veins. Sherman Morgan, his most noted son, was the sire of Vermont Black Hawk, the founder of the Morgan or Black Hawk family of trotters. From the Black Hawks came the Ethan Allens and other less prominent strains.

Daniel Lambert was perhaps the most noted individual descendant. His dam was a daughter of Abdallah, the sire of Rysdyk's Hambletonian.

The above is a brief account of the most noted individuals that have served as a basis for the building up of the great breed of trotting horses of today.

The breed has been subdivided into families or strains, each of which trace back through the sires to a particular individual. The Hambletonian family traces back to Rysdyk's Hambletonian; the Mambrino family to Mambrino Chief; the Bashaw family to Grand Bashaw; the Clay family to Henry Clay, the son of Andrew Jackson; and the Morgan family to Justin Morgan.

There is quite a close relationship between the Hambletonians and the Mambrino family. Imported Messenger's son Mambrino might be said to be the grandsire to both families, for one of his sons, Mambrino Paymaster, got Mambrino Chief, the founder of the Mambrino family, while another son, Abdallah, got Rysdyk's Hambletonian, the originator of the Hambletonian family. There is a somewhat similar relationship existing between the Bashaw family and the Clay family, the founder of the Clays being a grandson of the originator of the Bashaws.

The name thoroughbred is not applicable to the American trotting hose, but is used to designate a particular class of English trotting horses. A horse that is eligible to registry on the books of the American Trotting Register is called standard bred and this eligibility may be obtained either by inheritance or by performance. A. G. M.

Columbus Horticultural Society.

The Columbus Horticultural Society will hold its first autumn meeting on Saturday, September 29, 1900, at the Horticultural Building of the State University, at 2 o'clock p. m.

Full reports on the summer's work are expected from the chairmen of all the committees.

"Fruit Notes From the Fair," Prof. Wm. R. Lazenby; "Some Notes and Impressions on the Summer's Work," F. K. Duke. Wm. R. Lazenby, President; H. C. Price, Secretary.

Prehistoric Agriculture.

The searching party of Curator Mills of the Ohio Archæological and Historical Society brought to light many things bearing upon the life and habits of the prehistoric people of America, and added many valuable specimens to the museum. The party spent the entire summer in excavating at the Baum village site, near Bourneville, O.

In the ash pits of the village site were found quantities of charred corn and corncobs. The corn had evidently been placed in layers and had doubtless been charred or parched to preserve it. In these pits were also found hickory nuts, walnuts, butternuts and hazelnuts, also beans and the seeds of the pawpaw and wild plum. Seeds and stems of various grasses were found in a good state of preservation. These grasses, as well as other material not already determined, will be identified and classified during the winter. Hoes of muscle shells and slate were among the various implements found.

It has been the theory for a long while that the prehistoric men of America were an agricultural people, living largely upon the product of the soil growing, both wild and cultivated. The summer's work of Curator Mills seems to prove the truth of this theory.

The Year-book of the Department of Agriculture for 1899 makes a very valuable addition to any library, but especially to the library of an up-to-date farmer. Prepared during the closing months of the century, it is meet that it should present to its readers a picture of the development of Agriculture in the United States during the past hundred years. The volume contains 880 pages, more than 600 of which are devoted to special articles which aim to give a resume of the achievements in every branch of science related to agriculture. The present Year-book far surpasses any of its predecessors not only in the scope of the work undertaken, but in the general workmanship, especially in the matter of engravings and cuts.

An Inquiry

Into Some of the Causes of Plant Growth. Abstract of Thesis by E. O. Fippin, June, 1900.

[Continued from September Issue.]

The results as shown by plant growth were: First, A marked increase in dry matter in those pots receiving the most water; second, with the exception of the sand and first bottom soil no increase was noticeable from the use of fertilizers; third, the figures showing the effect of soil porosity were somewhat contradictory being influenced by other factors to such an extent that no definite conclusions could be drawn; fourth, the effect of root surface could not be determined because of various modifying elements. Aside from the factors already mentioned, the temperature and humidity of the air in the house, and the amount of sunshine during the growth of the corn had a considerable influence upon the growth produced. The air was unusuall dry and the temperature fluctuated many degrees from day to day. From comparison of figures taken at the Columbus Weather Bureau office it was found that the total number of hours of sunshine during the investigation was far below the average for that received for corresponding periods in other years by the corn plant when grown under field conditions. Plants grown when the relative humidity of the air was high and the number of hours of daily sunshine increased, attained a normal growth. The results indicate that the supply of moisture to the growing plant is one of the most difficult factors to control and is in a large measure responsible for the results obtained.